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ABSTRACT

The work completed to date on the development and validation of a procedure for assessing the micro-environments of preschool children is summarized. It was speculated that the lack of evidence that compensatory programs facilitate developmental changes in children might be due to actual lack of influence by the programs, to the subtlety of the influence, and/or the inappropriateness of the conceptual and analytical approaches to the data. The development and validation of the procedure was guided by two sets of hypotheses: that adequately reliable and meaningful factors would emerge from a factor analysis of the micro-environment assessment data, and that the factors would relate to post-test and change criteria, respectively. The children were observed in their natural program environments and the data derived was reduced through factor analysis to individual child environment summary scores. Multiple regression analysis was performed on this data and the above hypotheses were supported. Appendices include the observation recording sheet and data on the intercorrelations and/or factor loadings of 33 environment items, 21 predictor variables, and 8 criteria variables. (PR)

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ASSESSING THE MICRO-ENVIRONMENTS OF INDIVIDUAL PRESCHOOL CHILDREN

John Dopyera
Syracuse University
Head Start Evaluation Project

Final Report to
Office of Economic Opportunity
Head Start Evaluation and Research
Contract #OE04120
December 1969

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The purpose of this report is to summarize work completed to date on the development and validation of a procedure for assessing the micro-environments of preschool children. Micro-environment, as used in this report, refers to (1) events which occur in the immediate environment of a child and which are sensorially accessible to him and (2) other setting phenomena which act as a medium for a child's behavior.

The study addresses problems of conceptualization and assessment in regard to effects on children of participation in compensatory preschool programs. To date, little evidence exists to support the conclusion that programs act to facilitate desired developmental changes in children. The lack of such evidence despite considerable research may be due to (1) actual lack of influence, e.g. the programs may be failing relative to the task; (2) the influence may be too subtle for assessment with existing measurement procedures; (3) the conceptual and analytic approaches may be inappropriate for handling data to adequately examine program influence. It is to the latter two concerns that this study is addressed.

The following rationale guided the development of the study. Since children in the same molar environment often bring to bear different histories and expectations and, in addition, then encounter different experiences, it was felt that program encounters of a given child need to be determined. Procedures which document only some facets of the general environment are not adequate to obtain this kind of data. Observations of an individual child are necessary and should include documentation of how the child, how the child uses his environment, what contextual restraints and facilities exist.

Additionally, it was believed that an analysis of program data should be undertaken relative to individual differences of children. It would

be expected that if analysis is not done relative to individual child characteristics, that is, if all children within a given program are lumped together for analysis, interactions may be cancelled out. The consequences of this concellation effect would be that few significant differences could be determined. And finally, since it was believed that program factors might be relevant for some criteria but not for others, multiple criterion measures were thought necessary as part of procedure and program validation attempts.

Thus, in the present study, observations were made of children in their natural program environments; the data derived was reduced via factor analysis to individual child (micro) environment summary scores. These summary scores along with individual child pre-test data, were correlated with individual child post-test data on several cognitive-verbal and performance-measures.

The objectives, then, of this study have been to (1) develop a methodology for sampling, observing, and recording encounters of preschool children in and with their immediate environment and (2) analyze child change data so as to optimize the determination of interactions between individual child variables and program encounters as determined by the above micro-environment methodology.

The following methodological hypotheses served to guide procedure development and validation:

(1) Reliable determination of environmental data may be obtained through sampled observations.

(2) Program environmental data derived from individual child observations will produce meaningful factors.

(3) Factors determined will be related to child outcomes (i.e. post-test scores).

(4) Predictive validation will be greater when individual subject and program environmental data are included in contrast to either child or program data when considered separately.

(5) Program environment variables will contribute differently in relation to different criteria.

Procedure development and validation will be presented separately within the methodology, results, and discussion sections of this report.

Methodology

Sample

The sample was drawn from children participating in Head Start classes in upstate New York during 1969-70. The four centers in the area which had previously been selected for the National Head Start Evaluation were included. The study sample consisted of eight children from each of ten classes. These eight subjects were selected from those children in the class which were part of the national E and R sample and from which pretest data had been obtained. From that pool further random selection was made under conditions of obtaining balance of sex and race. Table I shows the race and sex distributions for each sample class.

Attrition brought the original sample of 80 subjects to 68. Subjects were not used if there was lack of sufficient observational data (a minimum of thirty observations) due to excessive absenteeism or unexpected termination of a center program or if the subject terminated contact with the program prior to post-testing.

Assessment procedure

Micro-environment assessment, *per se*, consisted of three phases - sampling, observing and recording, and data reduction.

Table I

Sample Race and Sex Distribution and
Observer Assignment, by Class

Center	Class	N	Observer Assignment	Race and Sex			
				WF	NF	WM	NM
Center U	A	7	3 - 4	2	2	1	2
"	B	5	3 - 4		3	1	1
"	C	8	3 - 4		4	1	3
"	D	6	3 - 4				6
Center	E	5	1 - 2	1	1	2	1
Center Gn	F	7	1 - 2	4		3	
"	G	8	1 - 2	4		4	
Center Ge	H	7	5 - 6	1	3	1	2
"	I	8'	5 - 6	2	2	2	2
"	J	7	5 - 6	1	3	1	2
Total	10	68	-----	15	18	16	19

Sampling. As the concern of micro-environment assessment was to determine the extent to which a target child (1) is impinged upon by his environment and (2) uses his environment as a medium for his behavior, and as each child participates in a program several hours a week, a method was required for sampling the encounters a child had with his program. A minimum of 30 four-minute observations were obtained for each of the subjects included in the study.

Although ideally these observations would have been randomly obtained across a specified program period, the expense of following this procedure would have been prohibitive. Therefore, a blocking schedule was used in which the eight subject children in each class were randomly placed into a schedule in two groups of four each which were observed in order by alternating observers. Observations were made on a given child no more frequently than every other day. The observing schedule, in addition, rotated the children so that the first observation on a given day was not repeatedly made on the same child. Observations were then made sequentially for the four children in a sampling block during the program day.

Observing and recording. The observation procedure sampled two two-minute periods with recording done immediately after each two-minute period. The task of the observer was to indicate whether an event occurred or not during the two-minute observation time. In all cases items were binary and non-contingent. That is, each item referent could potentially have been recorded as present during each observation.

The first of the two-minute observations included (1) the target S's physical location and posture; (2) focus and coordination of S's behavior; (3) a written and checklist indication of facets of the physical environments encountered - toys, people, equipment, etc.; (4) affective, other

vocal and verbal S behaviors; (5) affective, other vocal and verbal behaviors of other children in the immediate vicinity of the target child; (6) interpersonal verbal and non-verbal encounters between any adult and the target S and any other child and the target S; (7) conditions which might serve to qualify the accuracy of the observations; (8) behavioral indicators of S such as tics, exaggerated gait, etc.

The second two-minute observation period included (1) an indication of the context of the child's behavior, i.e. activity, his choice or not; (2) whether the class group was intact or separated; (3) brief activity description; (4) codes for target child, peer, teacher, aide, and other adult activities - borrowed from OSCI (Stern, 1968); (5) minimum distances between target child and others during the two minute observation; (6) sanctions (coded) given by adults to children, including the target child. These latter codes, along with interaction codes referred to in the prior phase, were coded for directedness which refers to whether the sanction was focused specifically on the target child, on the target child as a sub-group member, or as a member of the class. The recording sheet is presented in Appendix A.

Observers were able to record from 25 to 30 observations in a half day session; thus, when all children were present in the block being observed, 6 to 7 observations per day could be made for each child. Observations were thus spread over a minumum five-day period. When a child was absent he was added to the rotation schedule for the block to be observed on his next visit.

Because of the wide distance between centers, observers were hired from local areas. Training was done at the Syracuse Evaluation and Research Center and in the local centers. Two observers were hired in each of two centers and the writer and his assistant observed in the remaining two

centers. The assignments of observers to centers are presented in Table I. Training consisted of introducing the observers to the study and to the items on which discriminations were to be made, allowing three days of unmonitored practice with the codes in the respective center classes, and then monitoring of the observers to check on correctness in item use..

Data reduction. Observation records were date-time coded and transferred to tally sheets. Data for each subject were converted to proportions to adjust for differences in the total number of observations. The datum for the study thus consisted of the proportion of item occurrence, or base-rate.

Item selection was necessary since with 68 Ss and a lower limit of a 2 to 1 ratio of observations to dimensions, a minimum requirement for factor analysis, a maximum of 34 items could be included. Thus, a priority system was established for selection of items to be included in the preliminary factor analysis. The system placed high priority on "context" variables and input to S variables, which showed variation between subjects. Most variables included had a total base-rate which was more than 10%.

The items included were grouped into one of three sets - context to S, S behavior - indirect, and input to S. Items included in each group are as follows:

Context to S. General setting including physical and organizational facets of the environment.

1. Location: in main room - Child location, indoors, and in main room of program.
2. Location: in other - Child location, indoors, and in other than main room of program.
3. Support: floor - Child was physically supported by the floor.
4. Support: ground - Child was physically supported by the ground.

5. Support: furniture - Child was physically supported by furniture.

6. Class intact - The class group (those of 15 children present) was intact.

7. Class separate - The class group was separated; a part of the group was out of sight in another location.

8. S choice/class - The S was allowed to choose his own activity.

9. Teacher choice/class - The teacher or other adult present determined the S's activity.

S Behavior - Indirect. S behaviors which might possibly be a function of the setting and which might thus serve as an indicator of that setting.

10. Locomotion: rapid - Child locomotion which was faster than walking.

11. Coordination: non-regular - No more than ordinary coordination for behavior maintenance, e.g. body support, was manifested. For example, no large muscle coordination, no eye-hand coordination, no verbal with physical movement coordination were observed.

12. Persistence: involvement same - S behavior which was persistent, i.e. S was involved in the same activity for the entire two minute observation.

13. Inaudible - A qualifier indicating that S spoke but could not be clearly heard.

14. Affect: smile - Clear indication that the S smiled.

15. Finger-mouth - S put or had finger in his mouth.

16. Subject to peer: tells to do - S told a peer to do something.

Input to S. A specific input occurred directly to S or in the immediate vicinity of S from adult or from members of the peer group.

17. Group affect: giggle, laugh - Peer giggling and/or laughing occurred.

18. Group affect: shriek, yell - Peer shrieking and/or yelling occurred.

19. Group affect: cry, sob - Peer crying and/or subbing occurred.

20. Group affect: loud talk - Peer loud talk occurred.

21. Group affect: smile - Peer smiling occurred.

22. Group/Vocal-verbal/Non-affect mouth sounds - Other non-affective vocal and or verbal behavior occurred.

23. Adult to S: calls for attention - Adult calls for S attention.

24. Adult to S: tells what doing - Adult tells what (s) he is doing.

25. Adult to S: tells other to do - Adult tells someone (child) to do something.

26. Sanction: involvement - Adult indicates that child should become involved in some activity.

27. Sanction: location - Adult indicated where S should be located.

28. Sanction: time - Adult indicated that it is or isn't (the right) time to be doing something.

29. Sanction: posture - Adult indicated that a child's posture should be different than it is.

30. Sanction: correct - Adult indicated that a task should or shouldn't be done in a given way.

31. Sanction: noise/motion - adult indicated that the activity level was too high.

32. Sanction: fair share - Adult indicated that an equitable use among Ss of some finite resource should be made.

33. Sanction: location-prop - Adult indicated where toys or materials should be placed and/or where belonged.

As base-rates were the prime data in this study, extent of agreement between observers on base rate was used as an estimate of reliability. Table II shows reliability estimates for each observer pair and all the observers combined for each of the 33 environmental items included in the factor analysis.

It should be noted that the reliability estimate is based on the extent of agreement in base-rate for the given item for each subject. The reliability estimate is expressed as the percentage of agreement within 10 percentage points.

The 33 item-variables were subjected to factor analysis. A varimax

rotation factor analysis program developed by Veldman ( ) produced seven factors. Factor scores (in the form of z scores) for each of the subjects were also provided by the program. These factor scores were included as predictor variables in the multiple regression analyses undertaken relative to the criterion measures in the study. The factor analyses (and the correlation matrix determined as the preliminary step) were based on scores indicating proportion of occurrence of the behavior or event.

Multiple regression analysis. A stepwise (linear) regressing analysis (Veldman,) was undertaken to determine the relationship between facets of a child's micro-environment, the child's pre-test scores on several cognitive verbal and performance measures, and the child's post-test scores on these same measures.

The seven micro-environment factor scores, three additional setting scores, one observation qualifier, three subject demographic indicators, and the seven pre-test scores made up the 21 independent (predictor) variables of the study. The seven post-test scores and the MIA change socre were the criterion (dependent) variables.

The three setting variables included were two indicators of the number of props encountered by S and the number of days S actually attended the program. The first prop indicator was a minimum estimate (prop-Min) of the number of toys, equipment, etc. S encountered and the second (prop-Max) was a maximum estimate. The prop estimates were taken from observational data and the attendance was from teacher records. The attendance data was not corrected for total number of program operation days.

The total number of observations varied sufficiently (although for all subjects included there was a minimum of thirty) to warrant inclusion as a potintial qualifier even though the conversion of micro-environment data to base-rates presumably corrected for possible differences.

The three demographic variables included were S age (in months) at the time of pretesting, S ethnicity - Caucasian or Negro, and S sex - male or female.

Seven test scores were included as predictor and as the criterion variables. Pre-test scores served as predictor variables and post-test scores from the same tests served as criterion variables. The seven scores were derived from four tests individually administered as part of the Head Start Evaluation project. These were administered by the regular staff members of the Head Start Evaluation Center; observations were obtained by a separate staff. Two scores were derived from the Stanford-Binet - MA and IQ. One score (FR) was derived from a rating schedule completed by the Stanford-Binet tester which noted factors adversely affecting test performance. The amount of time S took to complete the Caldwell Preschool Inventory was a fourth variable. Three scores were derived from the Animal House subtest of the Wechsler Intelligence Scale for Children (WPPSE) - time for test completion in seconds, number of errors, time for test completion in seconds, number of errors, total raw score attained.

An additional criterion score, MA change, was included. This socre was derived by subtracting the pre-MA from the post-MA. In all except three cases the change was positive. The minuses (-1, -1, -2) change scores were low and were thus included as zeros.

Results

As assessment procedure development and validation are logically distinct phases, they are separately reproted here.

Procedures development.

Two hypotheses were associated with procedure development. The first

concerned the reliable determination of micro-environment data, and the second concerned the emergence of meaningful factors.

Table II shows the raw score means and standard deviations for the thirty-three environment items and the observer pair and total reliabilities associated with each.

The means and standard deviations reflect an adequate amount of variation between child settings and the reliabilities, while moderate, appear to be generally adequate.

An examination of Table II would support confirmation of Hypothesis I that reliable determination of micro-environment variables could be obtained.

Hypothesis II: Program environmental data derived from individual child observations will produce meaningful factors. Factor analyses of the environment variables produced seven factors, which accounted for 76 percent of trace. Five of the factors appeared meaningful. Item contributions to each factor, factor descriptions and tentative names, are reported separately for each factor in the following sections. Intercorrelations of the thirty-three items are presented in Appendix B, and Appendix C shows the factor loadings of the thirty-three items for each of the seven factors.

Factor I, which accounted for 30.820 percent of the total factor trace, appeared to reflect four themes: teacher domination, low affect in children, divided class activities, and diverse settings. Teacher domination was evidenced by adult direction and many diverse sanctions. Low affect in the children was evidenced by negative loadings on group and C smiling, crying, talk. Divided and diverse activities were evidenced by items: Class; not intact, Location (negative loading), Furniture (negative loading).

Table II

Means, Standard Deviations and Reliabilities for
Thirty-three Environment Variables (N=68)

Variable Name	M	S.D.	Reliability* Pair 1	Pair 2	Pair 3	Total
Context to S						
1. location: in main run	74.00	14.40	.54	.60	.45	.68
2. location: in other	10.28	11.03	1.00	.90	.86	.93
3. support: floor	48.38	11.58	.40	.60	.50	.51
4. support: ground	12.28	8.87	.81	.60	.64	.69
5. support: furniture	53.62	11.50	.50	.50	.50	.50
6. class intact	81.07	16.63	.73	.45	.32	.52
7. class separate	8.32	9.49	1.00	.60	.59	.75
8. S choice/class	28.65	14.44	.38	.50	.64	.50
9. teacher choice/class	64.32	13.38	.50	.75	.23	.48
S Behavior-Indirect						
10. locomotion: rapid	10.74	6.80	.61	.85	.77	.73
11. coordination: none/regular	85.21	8.51	.42	.70	.64	.57
12. persistence: involvement same	74.60	11.99	.61	.50	.41	.51

Table II (Continued)

Variable Name	M	S.D.	Reliabilities*			
			Pair 1	Pair 2	Pair 3	Total
13. inaudible	10.13	9.98	.85	.35	1.00	.75
14. affect: smile	31.71	14.43	.27	.40	.27	.31
15. finger - mouth	14.79	12.11	.35	.60	.82	.57
16. S to peer: tells to do	10.90	8.12	.85	.40	.50	.60
Input to S						
17. group affect: giggle-laugh	24.94	21.25	.00	.65	.86	.47
18. group affect: shriek-yell	20.24	21.33	.04	.60	.86	.47
19. group affect: cry-sob	4.12	6.80	.77	.95	1.00	.90
20. group affect: loud talk	32.75	28.91	.11	.30	.77	.38
21. group affect: smile	11.97	9.37	.55	.50	.82	.57
22. group/Vocal-verbal/Non-affect Mouth sound	18.15	18.82	.00	.75	.82	.48
23. adult to S: calls for attention	13.57	14.36	.81	.85	.27	.65
24. adult to S: tells what doing	10.03	11.35	.81	.85	.59	.75
25. adult to S: tells other to do	40.09	18.95	.15	.35	.18	.22
26. sanction: involvement	43.88	24.60	.42	.40	.14	.35

Table II (Continued)

Variable Name	M	S.D.	Reliability* Pair 1	Pair 2	Pair 3	Total
27. sanction: location	27.32	12.28	.61	.55	.41	.53
28. sanction: time	13.74	8.16	.61	.55	.45	.54
29. sanction: posture	11.44	8.60	.88	.15	.64	.59
30. sanction: correct	12.59	9.02	.81	.65	.45	.65
31. sanction: noise/motion	11.50	6.44	.46	.65	.73	.60
32. sanction: fair share	7.21	5.37	.85	.75	.54	.72
33. sanction: location-prop	10.59	6.98	.81	.60	.82	.75

In addition Location-in/out/etc. did not load on this factor. The factor has been named Adult directed and highly controlled small group activities. Table III contains item descriptions and loadings for this factor.

Factor II, representing 14.266 percent of the total variance accounted for by the factors, has been labeled Diffuse Activity Structure. Although some items evidenced adult efforts to structure (Teacher choice; A to S-tells others to do; Sanction-posture), other items seemed to represent a relatively unfocused situation (Coordination - none/regular; Locomotion, rapid; Inaudible; Persistence-Involved same (negative loading). The loading on affect items would seem to reflect rather positive emotionality, i.e. positive loading on Gp affect-smile and Affect (S)-smile along with negative loadings on Gp affect-cry/sob and Gp affect-shriek/yell. The combination of these items seems to suggest a setting in which an adult structures a situation which is noninvolving for the children. Item descriptions and loadings are presented in Table IV.

Factor III represented 10.052 percent of total factor trace. Items indicating activity in the Main room with an Intact class received substantial loading. The item Support: furniture received positive loading and may be an indication of sedentary activity. The negative loading on Inaudible and the appearance of the item, Persistance: Involved same, are indications of quiet involvement. No items indicating teacher structuring or sanctioning and no items regarding emotionality appear. This factor has therefore been designated Undisrupted Independent Effort. Table V contains the item loadings for Factor III.

The loadings in Factor IV seem best labeled as Adult Tolerated Non-settled Behavior. The factor accounted for 5.785 percent of the variance

TABLE III

ROTATED FACTOR LOADINGS FOR FACTOR I

Item #	Item Name	Loading
26	Sanction-Involvement	.871
13	Group-Loud Talk	-.861
10	Group-Giggle/laugh	-.852
19	Adult to S- tells what doing	.820
16	Group- non-affect mouth sounds	-.807
18	Adult to S- calls for attention	.796
33	Sanction-location prop	.766
23	Class-separate	.764
11	Group-shriek/yell	-.760
30	Sanction-correct	.722
28	Sanction-time	.670
6	Support-furniture	-.651
20	A to S - tells other to do	.635
22	Class-intact	-.624
5	Support-groupd	.616
24	S choice-class	-.578
12	Group affect-cry/sob	-.541
29	Sanction- posture	.411
31	Sanction- noise, motion	.344
17	Finger-mouth	-.332
25	Teacher choice	.321

TABLE IV

ROTATED FACTOR LOADINGS FOR FACTOR II

Item #	Item Name	Loading
25	Teacher choice	.785
7	Coordination-none/regular	.775
3	Locomotion-rapid	.700
24	S choice	-.669
29	Sanction-posture	.593
4	Support-floor	-.538
9	Inaudible	.489
18	Adult to S-calls for attention	-.415
15	Group affect-smile	.394
20	Adult to S- 'ells other to do	.389
12	Group affect-cry/sob	-.382
14	Affect (s)-smile	.363
8	Persistance-involved same	-.358
11	Group affect-shriek/yell	-.301

attributed to all factors. The items Locomotion, rapid, Gp affect-cry/sob, Gp affect-shriek/yell, Finger/mouth (negative loading) rather clearly reflect unsettled behavior. Items Support-floor and Support-furniture (negative loading) may indicate nonsedentary activity. Only one sanction item received any substantial loading implying adult tolerance despite the "unsettledness"suggested by the above items. Item descriptions and loadings for Factor IV are presented in Table VI.

Neither Factor V nor Factor VI seemed to have interpretable meaning and were therefore not named. Factor V accounted for 4.846 percent of the factor trace and Factor VI 6.238 percent Tables VII and VIII contain the item descriptions and loadings.

Factor VII, although containing only three items receiving substantial loading, seems readily interpretable. The items reflect S characteristics and are seen as representing an involvement (Persistance-involved same) in which the S is directing efforts to do something (S tells peer to do) and absence of Affect-smile. This factor has been called Subject-directed Striving. It accounts for 4.457 percent of factor trace. Items descriptions and loadings are presented in Table IX.

It will be noted from an examination of Tables III through IX that the first two factors are heavily weighted with Context to S items (i.e. setting, structure) and the latter factors are heavily weighted with S behavior as indirect indicators of the setting. Input to S items are somewhat scattered but more heavily evidenced in the first two factors.

An examination of these tables lends support for the second hypothesis that meaningful factors will emerge from micro-environmental assessment.

TABLE V

ROTATED FACTOR LOADINGS FOR FACTOR III

Item #	Item	Loading
2	Location; In, other	-.874
1	Location: In, main	.800
22	Class intact	.651
9	Inaudible	-.591
8	Persistence: Invol sm	.502
6	Support: furniture	.340
5	Support: ground	-.328
23	Class separate	-.313

TABLE VI

ROTATED FACTOR LOADINGS FOR FACTOR IV

Item #	Item	Loading
3	Locomotion, rapid	.828
12	Group: cry/sob	.574
17	Finger/mouth	-.358
11	Group: shreik/yell	.344
6	Support: furniture	-.331
4	Support: floor	.314
27	Sanction: location	.309

TABLE VII

ROTATED FACTOR LOADINGS FOR FACTOR V

Item #	Item name	Loading
32	Sanction-fair share	.807
17	Finger-mouth	.593
8	Persistance-involved same	-.378
27	Sanction-location	.324

TABLE VIII

ROTATED FACTOR LOADINGS FOR FACTOR VI

Item #	Item name	Loading
31	Sanction-noise, motion	-.756
4	Support-floor	-.535
5	Support-ground	.438
29	Sanction-posture	.416
1	Location-in main room	-.374
23	Adult to S-tells other to do	.342

TABLE IX

ROTATED FACTOR LOADINGS FOR FACTOR VII

Item #	Item	Loading
22	S tells Peer, to do	.712
14	Affect; smile	-.699
8	Persistence: Inv. sm	.316

Procedure validation

Hypothesis III. Factors determined will be related to child outcomes, i.e. post and change criterion measures.

Table X shows the correlations between the seven factors and the post-test and change criterion measures. Correlations between some additional predictor variables which had not been considered in the factor analysis and the eight criterion measures are also reported in Table X for comparative purposes. These included three program variables - Props-Min, Props-Max, Days Attended; three subject demographic variables - Age, Ethnicity, and Sex; and the S pre-test scores. (Intercorrelations among predictor variables are reported in Appendix D and the criterion intercorrelations are in Appendix E. Criterion $\bar{X}$'s and SD's are shown in Appendix E.)

An examination of Table X shows Factors I, III, IV, and VII significantly relate to the cognitive measures - mental age, IQ, and Animal House score. Factor III relates to a non-cognitive criterion, time to complete the Animal House subtest of the WPPSI.

The three environmental variables (Prop-Min, Prop-Max and days Attended) which were not included in the factor analysis are relevant to consider in regard to hypothesis III. Prop-Min was significantly related to the Factors (FR) score and PSI; Prop-Max was related to MA change.

The low order but significant relationships between environmental indicators (both the factors and added prop variables) tend to support Hypothesis III.

Hypothesis IV. Environmental indicators will contribute variance predictability on criterion test socres in a multiple correlational analysis.

Table X
Correlations of twenty-one Predictor Variables with Each of Seven Criterion Variables

Predictor Variables	Criterion Variables (post & change)							
	MA	IQ	FR	PSI-T	ANT	Ah-E	Ah-S	MA ch.
Factor 1	-262*	-261*	-028	-017	-081	149	-081	-035
2	050	179	-092	-057	-031	-217	230	-196
3	153	056	-038	-426*	-315*	019	238	109
4	-130	-069	003	-164	-137	156	-034	-323*
5	-210	-134	146	185	110	068	-180	-105
6	018	025	057	002	103	093	-113	007
7	393*	362*	-068	-142	-048	-329*	348*	110
Props-min	-088	-103	-289*	286*	096	092	-162	-003
Props-max	076	-033	-042	-016	-115	-105	168	270*
Days Attended	159	092	-038	-083	-115	111	161	216
Age/mo	056	-277	065	013	-099	071	-034	060
Ethnicity	037	-053	099	-081	-159	100	035	290*
Sex	-038	058	118	-133	174	-018	-123	081
MA (pre)	712*	703*	-231	-066	164	-521	405	-412
IQ (pre)	200	259*	-164	244	201	-201	072	-094
FR (pre)	-238	-279*	307	227	-046	071	-002	218
PSI true (pre)	-051	000	-005	031	157	033	-212	-116
Animal House true (pre)	307*	184	-034	-114	067	-440	369	082

Table X Continued

Animal House Errors (pre)	-562*	-486*	281	200	068	569	-623	-007
Animal House Score (pre)	396*	445*	-271	-151	003	-354	362	-252
No obs.	085	075	162	-013	-110	105	177	103

The results of a step-wise multiple regression analysis lent support to Hypothesis IV. Multiple correlations and F tests between the twenty-one predictors and the eight criterion variables are presented in Table XI. It will be noted that all F's were significant with one exception, the Adverse Factor's rating.

Tables XII through XIX show the iteration sequences for each of the eight criterion measures separately. Each of the eight will be discussed in turn. It should be noted that the iteration sequence reflects increased contribution via different combinations of predictors. Cumulative sequencing has not been presented in the tables beyond the point where additional iterations failed to contribute an additional full (1) percent to criterion variance predictability.

Criterion 1, Post MA. Table XII shows the iterative sequencing of subject environmental predictors on the MA score derived from a post-test administration of the Stanford-Binet. It will be noted that while the pre-test MA accounts for fifty percent of the post-test score and the Animal House Error count predicts an additional six percent, the various environmental factors add even more (approximately twelve percent when Days Attended is included as an environmental variable).

Criterion 2, Post IQ. Table XIII shows the iterative sequencing of subject and environmental predictors on IQ as derived from the post Stanford-Binet testing. As would be expected, Mental Age-Pre predicts fifty percent of the post IQ variance, while S age and Errors on the Animal House are associated with an additional ten percent. Environmental actors contribute small but persistent variance predictability.

Criterion 3, Adverse Factors. Iterative sequencing of subject and environmental predictors of the post-test rating of Factors (FR) adversely affecting test (Stanford-Binet) performance are shown in Table XIV.

TABLE XI

MULTIPLE CORRELATIONS (AND R SQUARED) FOR 21 PREDICTOR AND EIGHT VARIABLES AND F TESTS

Criterion	R	R SQ	F-RATIO	P (exact)*
1. MA (post)	.847	.717	5.425	.0000
2. IQ (post)	.837	.701	5.026	.0000
3. FR	.650	.422	1.568	.1025
4. PSI (time)	.717	.515	2.272	.0106
5. AH (time)	.670	.449	1.747	.0582
6. AH Errors	.775	.600	3.221	.0007
7, AH Score	.777	.604	3,270	.0006
8. MA Change	.700	.488	2.032	.0230

*Df N/D = 21/45

TABLE XII

ITERATIVE SEQUENCING OF PREDICTOR VARIABLES ON MENTAL AGE (POST) CRITERION

Predictor #	Name	Type	R SQ
11	Mental Age, pre	S:test	.506
18	Animal House Errors, pre	S:test	.564
20	Days attended	Envir	.598
4	Factor IV	Envir	.623
1	Factor I	Envir	.635
7	Factor VII	Envir	.649
5	Factor V	Envir	.659
6	Factor VI	Envir	.668
14	Prop Count-Max	Envir	.679

TABLE XIII

ITERATIVE SEQUENCING OF PREDICTOR VARIABLES ON IQ (POST) CRITERION

Predictor #	Name	Type	R SQ
11	Mental Age, pre	S:test	.494
10	Age	S:demo	.565
18	Animal House Errors	S:test	.592
7	Factor VII	Envir	.614
4	Factor IV	Envir	.629
14	Prop Count (Max)	Envir	.645

While the multiple correlation did not produce a significant F it is clear from an examination of Table XIV that environmental variables are making contribution to the variance accounted for. The Prop-Min count is particularly noticeable as are the other subject and environmental variables from which one might infer perceptual-motor practice opportunity or consequences of opportunity to practice perceuptal motor coordination, e.g. Animal House test, Factor III. Contributions from total number of observations are not readily interpretable.

Criterion 4, Post Preschool Inventory-Time. Iterative sequencing of subject and environmental predictors for PSI-Time (amount of time/min. taken to complete the Caldwell Preschool Test) during the post-test administration is contained in Table XV. It will be noted that the most effective predictor is Factor III, an environmental variable. Another environmental predictor, Props-Min count, adds ten percent to the predictive capacity.

Criterion 5, Post Animal House Time. Iterative sequencing of subject and environmental predictors on the time taken to complete the post-test administration of Animal House, is shown in Table XVI. Factor III, an environmental variable, is the best predictor of the post-test score and other environmental variables account for additional variance.

Criterion 6, Post Animal House Errors. Iterative sequencings for environmental and subject predictors on the number of errors made in the post-test administration of the WPPSI subtest, Animal House, are presented in Table XVII. While S variables contribute the majority of the variance predictability, environmental variables continue to add small amounts.

Criterion 8, M.A. change. Iterative sequencing of environmental and subject predictor variables on the difference in M.A. scores between pre- and post-testing, is reported in Table XIX. While the best predictor is

TABLE XIV

ITERATIVE SEQUENCING OF PREDICTOR VARIABLES ON FACTORS (POST) CRITERION

Predictor #	Name	Type	R SQ
15	Factors (pre)	S:rating	.094
13	Prop-Min	Envir	.175
18	Animal House Errors (pre)	S:test	.247
21	Total # observations		.280
20	Days attended	Envir	.301
3	Factor III	Envir	.319
17	Animal House Time (pre)	S:test	.335
9	Sex	S:demo	.349

TABLE XV

ITERATIVE SEQUENCING OF PREDICTOR VARIABLES ON PSI TIME (POST) CRITERION

Predictor #	Name	Type	R SQ
3	Factor III	Envir	.182
13	Prop-Min	Envir	.285
12	IQ (pre)	S:test	.322
5	Factor V	Envir	.362
15	Factors	S:rating	.396
4	Factor IV	Envir	.420
20	Days Attended	Envir	.442
10	Age	S:demo	.458
12	IQ (pre)	S:test	.477

TABLE XVI

ITERATIVE SEQUENCING OF PREDICTOR VARIABLES ON

ANIMAL HOUSE TIME (POST) CRITERION

Predictors

#	Name	Type	R SQ
3	Factor III	Envir	.099
11	Mental age (pre)	S:test	.131
4	Factor Iv	Envir	.153
9	Sex	S:demo	.192
21	Total # observations		.214
12	IQ (pre)	S:test	.237
5	Factor V	Envir	.260
13	Prop-Min	Envir	.281
6	Factor VI	Envir	.297
17	Animal House Time (pre)	S:test	.308
18	Animal House Errors (pre)	S:test	.316
3	Factor III	Envir	.328

TABLE XVII

ITERATIVE SEQUENCING OF PREDICTOR VARIABLES ON

ANIMAL HOUSE ERROR (POST) CRITERION

Predictor #	Name	Type	R SQ
18	Animal House Errors (pre)	S:test	.323
11	Mental age (pre)	S:test	.399
4	Factor IV	Envir	.426
3	Factor III	Envir	.449
7	Factor VII	Envir	.466
14	Prop-Max	Envir	.478
2	Factor II	Envir	.490
15	Factors	S:test	.503
9	Sex	S:demo	.518

TABLE XVIII

ITERATIVE SEQUENCING OF PREDICTOR VARIABLES ON

ANIMAL HOUSE RAW SCORE (POST) CRITERION

Predictor #	Name	Type	R SQ
18	Animal Houses Errors (pre)	S:test	.389
7	Factor VII	Envir	.434
21	Total # ovservations		.449
1	Factor I	Envir	.462
14	Prop-Max	Envir	.476
2	Factor II	Envir	.502
20	Days attended	Envir	.517
15	Factors	S:test	.527
3	Factor III	Envir	.538

TABLE XIX

ITERATIVE SEQUENCING OF PREDICTOR VARIABLES ON

MENTAL AGE (CHANGE) CRITERION

Predictor #			
11	Mental age (pre)	S:test	.170
4	Factor IV	Envir	.256
7	Factor VII	Envir	.309
18	Animal House Errors (pre)	S:test	.335
2	Factor II	Envir	.355
5	Factor V	Envir	.369
14	Prop-Max	Envir	.377
1	Factor I	Envir	.392
11	Mental age (pre)	S:test	.404

the MA pre-test score, it is clear from an examination of Table XIX that environmental variables contribute substantially to the total variance predictability on this criterion.

Examination of Tables XIII through XIX reveals that varying contributions are made to criterion variance predictability by environmental variables. The greater contributions are made to non-cognitive criterion measures e.g. adverse factors rating, time taken to complete the Caldwell Preschool Inventory and Animal House, but noticeable contributions are made to cognitive criteria as well. Although environmental contributions to criterion predictability vary, there appears to be at least minimal support for Hypothesis IV.

Hypothesis V. Environmental variables will have differential predictive capability among criterion variables.

One aspect of validation is the capacity for differential prediction. Within this frame of reference, the question was asked as to whether the environmental factors which emerged from factor analysis would differentially predict post- and change criterion scores. Would a factor, which was independent of other factors predict one criterion and not another?

An examination of Tables X through XIX lends support to Hypothesis V. Factors I, III, and VII appear related (in different ways) to cognitive measures and II and IV appear related (again in different ways) to non-cognitive measures. While no tests for contribution significance were made for the multiple correlations, it is clear from a cursory examination of these tables that varying contributions were made.

Summary of Results.

Two sets of guiding hypotheses were put forth concerning procedure development and procedure validation.

Procedure development. Adequately reliable and meaningful factors did

emerge from a factor analysis of the micro-environment assessment data.

Procedure validation. The factors, in turn, did relate to post-test and change criteria. Specifically, the following factor-criterion relationships were determined:

> Factor: Adult-directed and highly controlled small-group activities correlated negatively with MA post-test scores.
>
> Factor: Undisrupted independent effort correlated negatively with amount of time taken to complete the PSI and Animal House tasks.
>
> Factor: Adult tolerated non-settled (S) behavior correlated negatively with MA change.
>
> Factor: Subject-directed striving correlated positively with post-test MA and Animal House scores.

In addition, factor scores derived from micro-environment assessment data contributed varying amounts to total predictability of post-test and change scores in combination with pre-test predictor scores in a stepwise multiple (linear) regression analysis.

Discussion

One additional way of viewing these data concerns what they say about the actual programs which were described via this procedure. While the data were not analyzed for classroom similarities and differences, the general picture is one of homogeneous inactivity. Means for Location: Main Room (74.%) and Support: Furniture (54%) for all children in all ten programs support this Notion. The lack of Coordinated Behavior (85%) and Persistence: Involved Same (75%) also lends support to this, along with Teacher's Choice (64%) and Class Intact (81%). The relatively high use of Sanction; Involvement (44%) tends to give a picture of attempts by adults to (externally) motivate the children.

Work is currently in process to reanalyze these data to provide composite pictures of classrooms in quantitative as well as qualitive terms. Data

collected but not included in this study are also being examined for for inclusion in this extended analysis. Other analysis will examine different ways of scoring the data, possible curvilinearity in regression, and additional criterion scores.

While several concerns about individual-child-based (micro-environment) program assessment continue, more advantages than disadvantages are seen, as this phase of procedure development and validation comes to a close. The advantages are both theoretical and practical. On the theoretical side, opportunity is afforded for determining the actual encounters a child has instead of assuming that a set of inputs are equally available for all children - an assumption made throughout by most methodologies which are teacher based - either observation or self-report (see Doppera and Lay, 1969). In addition, by refocusing observations involving a given child on the factors which either impinge on him or serve as a medium supporting his behavior, a clearer picture of the "program" emerges than when child-behavior alone, or interactions are the unit of description. This refocusing thus allows for a direct conceptualization and assessment of the program as independent variables impinging on a child. In this regard, this approach would serve well as a quality control-device under conditions where interventions are assumed to be experimentally present yet the extent to which the treatment is present for any given child is an unknown.

There are three practical advantages. The observation system can be used with minimal training, by relatively naive observers. The system, with some additional work can be used in any setting (e.g. parent and child) involving a child in a natural environment, thus facilitating comparisons for a child or children between environments concurrently and/or across

time. The procedure also, with not much additional work, can utilize a machine scorable recording sheet thus saving hours of hand tabulating.

As used in this developmental form, several difficulties are seen. Too much was included which was not particularly relevant. This factor undoubtedly put a strain on the observers and directly and/or indirectly influenced item reliability.

The number of observations required to minimumally stabilize a base-rate clearly (retrospectively) varies by setting, child, and itmes. This factor may also contribute to reliability problems.

References

Dopyera, J. and Lay, M. Assessing the Program Environments of Head Start and Other Preschool Children. Final report to Office of Economic Opportunity, August, 1969.

Stern, C. et al. Observation of Substantive Curricular Input: Manual. U.C.L.A. Head Start Evaluation and Research Center, August, 1968.

Veldman, D. J. Fortran Programming for the Behavioral Sciences. New York: Holt, Rinehart and Winston, 1967.

Appendices

A. Recording Sheet

B. Intercorrelations of 33 Environemnt Items

C. Factor Loadings for 33 Environment Items on the Seven Factors

D. Intercorrelations of twenty-one Predictor Variables

E. Raw Score Means and Standard Deviations of Eight Criterion VAriables

F. Intercorrelations of Eight Criterion Variables

LOCATION	
IN: MAIN RM	
IN:OTHER RM	
OUT:PREM'S	
OUT: WLKTRP	
FLD TRP: IN	
FLD TRP:OUT	
OTHER	

POSTURE	*	**
PRONE		
KNEEL		
SIT		
STAND		
HANG		
BEND		
LEAN		
OTHER		

LOCOMTN	*	**
NONE		
SOME		
RAPID		
MONOLO		
OTHER		

SPPRT BASE*	**
FLOOR	
GROUND	
FURNTRE	
EQP/UNFXD	
EQP/SMFXD	
EQP/FXD	

COORD	*	**
NONE/REG		
LRG MUSC		
EYE/HAND		
VERBAL		
TIME		
OTHER		

SCOPE	*	**
GLOBAL		
REACTIVE		
SEEK/SCAN		
FOCUS FAR		
FOCUS NR		

ATTENDED	*	**
AROUND		
ADULT		
PEER(S)		
PROP		
OTHER		

PERSIST	*	**
WNDRD/GZD		
INVLD SM		
RECURRNT		
CHNGD FRM		
CHNGD NTO		
OTHER		

PERSON		
WATER		
OTHER		

AFFECT	S	GP
GIGGLE/LAUGH		
SHREIK/YELL		
CRY/SOB		
OUCH		
LOUD TALK		
NO/DNT/STOP!		
SURPRISE		
SMILE		
GRIMACE		
ANGER		
SOC UNACPT WD		
SOC UNACPT BH		
OTHER		

VOC-VERB,NON-AFFCT		
MOUTH SOUNDS		
WORD PRACT		
PHON PRACT		
PROP SOUND IM		
HUM-SNG SPON		
FNTSY (SELF)		
FNTSY (PEER)		
FNTSY (PROP)		
OTHER		

OBSVR QUALIFIERS	
S INAUDIBLE	
S WTCHS OBSVR	
S RESPONDS TO O	
OBSVR OVR LOAD	
S LVS/OBSTRD	
OBSVTN DISTANCE	

	Gp	S	T	I
BIKE				
BIKX				
TRUK				
WAGO				
BLOK				
BLOX				
TOYS				
FRAM				
INTR				
PUZZ				
SWNG				
LGDR				
JNGL				
CARO				
SLID				
COLL				
CRAY				
EASL				
FIPT				
PAIN				
SCIS				
WOOD				
CLAY				
SAND				
WATR				
TOOL				
FOOD				
OTHER				

	Gp	S	T	I
DOLL				
DRES				
HSKP				
TELE				
BUGY				
STOR				
ROPE				
BALL				
RHYM				
DANS				
LETT				
LOTT				
MATH				
SCIE				
SENS				
ANIM				
TABL				
CHRT				
CHBD				
FLBD				
COOK				
PUPP				
BOOK				
MOVI				
RECD				
PERS				
NONE				

TOUCHES

ADULT TO S			S TO ADULT			* PEER TO S			S TO PEER	
					CALLS FOR ATTENTION					
					TELLS WHAT DOING					
					INDICATES WANTS					
					TELLS OTHER TO DO					
					ASKS FOR HELP					
					ASKS PERMISSION					
					ASKS FOR NAME					
					ASKS FOR MEANING					
					ASKS FOR EXPLAN (NON-PERS)					
					ASKS FOR INFORMATION (PERS) (DOING/WANTS)					
					NON-VERBAL +					
					NON-VERBAL -					

APPENDIX A

S NAME _____ CTR -364- OBSVR _____

S CODE # _____ DATE _____ SEQ # _____ TIME _____/_____

TEACHER DEFINITION:

CLASS ORGANIZATION

INTCT	____	S CHOI	____
SEP	____	ADULT	____
COMB	____	PARLL	____
SEP-CMB	____	OTHER	____

			LARGE MUSCLE	SMALL MUSCLE	BUILDING	DRAMATIC PLAY	CREATIVE ARTS	WATCH/LISTEN	DISCUSSION	STRUCT LESSON	CLEANUP/SETUP	REST	TOILET/WASH DRESS	EATING	INTERVAL	INTERACTION	UNINVOLVED	
PEERS																		
SUBJECT																		
TEACHER																		
AIDE																		
OTHER ADULT																		
INVOLVEMENT																		
S LOCATION																		
TIME																		
POSTURE																		
TALK																		
CORRECT																		
NOISE/MOTION																		
PERS HARM																		
BOTHER																		
PEER HARM																		
COOPERATION																		
FAIR/SHARE																		
OWNERSHIP																		
SOC AMENITIES																		
LOCATION PROP																		
PROP HARM																		
ORDER/MESS																		
UNIFORMITY																		
WORD-DEED																		
ADULT AUTH																		
_____																		
_____																		

PULL HAIR	____	DISTRACTABLE	____	UNINTELLIGIBLE	____	ORIENT	____
SCRATCH BODY	____	FINGER/MOUTH	____	EXAGGER'TDGAIT	____	LISP	____
TAPPING	____	HAND TO FACE	____	LEGS/ARMS	____	YAWN	____
BITE LIP	____	BODY ROCKING	____	ACCIDENT	____	COUGH	____
SMILE SET	____	STUTTER	____	_____	____	_____	____

Appendix B
Intercorrelations of 33 Environment Variables**

Context to S	Var #	2	3	5	6	7	23	24	25	26	4	8	9	10	15	18
Location: in, main	2															
Location: in, other	3	-708														
Suppt: floor	5	370	-036													
Suppt: ground	6	-680	152	-478												
Suppt: furn	7	406	-252	-290	-516											
Class intact	23	717	-531	038	-525	604										
Class separate	24	-329	150	032	532	-671	-688									
S choice	25	298	173	388	-541	235	373	-445								
T choice	26	-111	-364	-490	428	045	-044	175	-896							
S Behavior (ind)																
Locomotion: rapid	4	083	-050	233	001	-122	150	055	199	-142						
Coord: non-reg	8	-104	-184	-384	228	211	013	-001	-511	574	-119					
Persist: involved Sm	9	404	-354	215	-194	-063	215	-130	277	-229	-063	-276				
Inaudible	10	-483	308	-321	412	-146	-208	238	-369	308	091	306	-456			
Affect:smile	15	-018	-111	-216	031	171	177	-052	-244	-316	048	146	-204	270		
Fruger Mouth	18	003	165	-006	-313	312	028	-231	154	-129	-177	227	-202	-053	013	
S to Peer: tells to do	22	-209	193	-056	216	-220	-362	295	-217	101	064	145	031	161	-210	-051

** Based on raw proportion S

* p>.05 (two tailed test)

decimal points omitted

Appendix B (Continued)

Input to S		2	3	5	6	7	23	24	25	26	4	8	9	10	15	18	22
Gigg-Laugh Group Att	11	567	-162	219	-706	531	654	-671	649	-420	180	-200	212	351	038	200	-320
Shriek-yell Group Att.	12	389	-078	323	-563	272	578	-553	670	-461	329	-277	193	312	-093	157	-228
Cry-sob Group Att.	13	218	-004	267	-332	088	420	-356	673	-509	384	-388	175	-134	-129	079	232
Loud Talk Group Att	14	469	-045	280	-706	415	612	-629	654	-451	191	-241	184	362	014	263	-230
Smile Group Att	16	-034	036	-313	-148	402	320	-383	077	148	020	228	-205	251	372	143	-156
Mouth sounds Group Att	17	565	-137	288	-751	507	633	-641	654	-451	064	-187	235	-440	-019	278	-346
A to S call to attn.	19	-174	-014	134	415	-550	-526	594	-184	-057	-138	250	243	175	-282	268	151
A to S tells what doing	20	-227	-009	133	458	-546	-504	531	-245	027	-097	-050	143	120	223	-286	264
A to S tells to do	21	-492	097	-261	639	-367	-426	435	-503	456	-013	323	352	429	052	-117	181
Sanct: Inv.	27	-312	-054	-152	651	-468	-463	561	-523	327	-151	213	-003	107	-055	-278	295
Sanct: Location	28	-079	-125	-269	159	226	221	-134	-267	411	221	495	342	303	309	194	027
Sanct: Time	29	-116	-041	023	309	-261	-347	440	-366	218	-072	062	020	016	-214	-237	236
Sanct: Posture	30	-489	077	-452	577	-108	-324	281	-584	518	-054	444	-319	478	180	-086	306
Sanct: Correct	31	-293	040	-087	516	-445	-454	597	-515	341	024	208	-207	322	-064	-204	275
Sanct: Noi-Mot	32	526	-162	411	-573	106	315	-147	290	-269	153	-121	304	326	-095	182	089
Sanct: Fair Share	33	-148	073	112	028	-056	-175	073	-058	030	126	102	-233	052	-106	231	094
Sanct: Location-prop.	34	-262	-116	-101	567	-471	-309	524	-510	365	-081	131	-036	082	026	-238	235

Input to S		11	12	13	14	16	17	19	20	21	27	28	29	30	31	32	33
Crp Att: giggle-laugh	11																
Crp Att: shreik-yell	12	768															
Crp Att: cry-sob	13	548	720														
Crp Att: laud talk	14	887	909	599													
Crp Att: smile	16	410	112	075	242												

Appendix B (Continued)

		11	12	13	14	16	17	19	20	21	27	28	29	30	31	32	33
Crp Voc- Verb: Non-Att. (mouth sound)	17	906	784	433	900	252											
A to S calls for attn	19	-576	-499	-387	-595	-577	-458										
A to S tells what doing	20	-638	-529	-338	-624	-501	-559	946									
A to S tells to do	21	-693	-664	-335	-738	-096	-809	809	495								
Sanct: Involvement	27	-776	-730	-550	-807	-379	-755	594	773	628							
Sanct: location	28	-038	-040	-082	-065	324	-150	-438	-307	327	994						
Sanct: time	29	-535	-576	-485	-590	-366	-487	571	587	367	662	-141					
Sanct: posture	30	-572	-591	-360	-646	141	-701	093	167	768	491	.383	270				
Sanct: correct	31	-729	-602	-373	-694	-305	-721	370	495	560	614	1199	464	1421			
Sanct: non-motion	32	515	467	154	528	-045	561	-189	-302	-506	-377	-133	193	-519	317		
Sanct: Fair share	33	-109	-125	-043	-168	082	-144	025	095	261	065	213	098	154	084	-151	
Sanct: location prop	34	-629	-607	-391	-699	-229	-673	490	548	574	703	178	461	477	576	-364	214

APPENDIX C
Rotated Factor Loadings for 33 Environmental Variables

Variable	Var #	Factor I	II	III	IV	V	VI	VII
Location: in main room	1	-297	-095	800	044	-041	-374	-051
Location: in other room	2	-055	-222	-874	-077	127	058	138
Support: floor	3	-084	010	007	828	051	-110	008
Support: ground	4	046	-538	162	314	238	-535	-026
Support: furniture	5	616	258	-328	108	-210	438	023
Class intact	6	-651	276	340	-331	144	146	-015
Class separate	7	052	775	051	-155	156	019	113
S choice/class	8	-014	-358	508	-034	-378	-037	316
Teacher choice/class	9	096	489	-591	182	-157	103	-166
Locomotion: rapid	10	-852	-201	290	091	028	-146	-035
Coordination: non-regular	11	-760	-301	154	344	-017	-157	090
Persistence: involve same	12	-541	-382	059	574	-029	187	060
Inaudible	13	-861	-252	155	131	-007	-249	030
Affect:smile	14	-109	363	-044	014	-137	-038	-699
Finger-mouth	15	-520	394	-103	-032	071	209	-254
S to peer: tells to do	16	-807	-296	286	-077	036	-275	-020
Gp affect: giggle, laugh	17	-332	119	-159	-358	593	-241	070
Gp affect: shriek, yell	18	796	-515	067	-163	-086	028	111
Gp affect: cry, sob	19	820	-278	072	-064	-004	100	165
Gp affect: loud talk	20	635	389	-206	137	198	342	-047
Gp affect: smile	21	266	281	-227	093	-087	-207	712
Gp/vocal-verbal/non-affect mouth sounds	22	-624	097	651	152	-047	058	-128
Adult to S: calls for attention	23	765	-001	-313	124	-111	-247	-041
Adult to S: tells what doing	24	-578	-669	056	177	128	048	173
Adult to S: tells other to do	25	322	785	151	-129	1143	066	-196
Sanction: involvement	26	871	124	055	-096	-040	181	109
Sanction: location	27	-101	700	043	309	324	123	-106
Sanction: time	28	700	008	137	-155	039	-015	170
Sanction: posutre	29	411	593	-220	036	067	416	058
Sanction: correct	30	722	260	-140	141	017	-022	022
Sanction: noise/motion	31	-344	-095	223	066	-086	-756	203
Sanction: fair share	32	164	043	-016	145	807	083	050
Sanction: location prop	33	766	175	085	095	095	169	-032
Percent of total variance		30.820	14.266	10,052	5.785	4.846	6.238	4.457

Appendix D

Intercorrelations of Twenty-One Predictor Variables (N=67)

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7	Props-Min.	Props Max.	Days attend.	Age	Ethnic	Sex	MA	IQ	FR	PSI	AHT	AHE	AHS
Factor 1																				
Factor 2	-006																			
Factor 3	009	-004																		
Factor 4	-004	-006	000																	
Factor 5	021	-015	-028	-025																
Factor 6	004	-010	008	011	043															
Factor 7	-010	019	-014	-016	-012	-084														
Props-Min.	176	-026	081	-068	031	098	-167													
Props-Max.	482	-432	108	-122	062	-235	084	059												
Days Attend.	178	-480	-031	-036	-062	-410	266	040	502											
Age	015	-244	252	-089	076	058	002	069	215	008										
Ethnicity	-190	-462	134	-129	-057	-171	304	-131	133	354	186									
Sex	-025	-157	-095	362	-074	125	-030	-049	054	-004	-165	-020								
MA - pre	-286	214	045	074	-088	007	304	-077	-134	-026	-015	-179	013							
IQ - pre	054	065	-136	082	-186	-374	080	-030	087	101	-235	-202	112	266						
FR - pre	-060	-190	-182	002	066	012	-097	-016	068	137	-038	162	-065	-395	-238					
PSI - pre	-337	-128	-125	-098	112	101	-072	025	232	003	-003	169	024	065	-116	-021				
AHT - pre	152	109	125	-117	-046	001	316	-115	185	-039	317	064	-035	212	-033	-139	-368			
AHE - pre	066	-208	-277	035	198	-022	-221	110	-054	035	-030	102	083	-496	-092	145	188	-611		
AHS - pre	-244	261	238	107	-128	018	005	-093	-186	-134	-224	252	001	560	168	-236	138	-112	-630	
No. Obs.	586	002	-050	-141	-024	051	238	042	450	344	003	-171	-019	027	085	-028	-244	115	-003	-129

Appendix E

Raw Score Means and Standard Deviations of Test-Criterion Variables

	Pre		Post		Change	
	M	S.D.	M	S.D.	M	S.D.
MA	45.403	8.888	54.463	8.871	9.030	6.301
IQ			91.836	15.970		
FR	21.657	12.017	16.433	7.555		
PSI time/min	14.627	3.878	12.776	2.503		
AHT	156.970	62.104	178.612	66.037		
AHE	8.702	5.895	5.298	5.665		
AHS	18.761	9.769	24.045	13.007		

N=67

Appendix F

Intercorrelations of Eight Criterion Variables

	MA	IQ	FR	PSI	AHT	AHE	AHS	MACH
MA								
IQ	899							
FR	-357	-376	[illegible]					
PSI	-182	-152	129[illegible]					
AHT	022	062	153[illegible]	270				
AHE	-629	-628	207[illegible]	084	-330			
AHS	598	563	-295[illegible]	-228	-411	-672		
MACH	324	234	-146	-110	-177	-126	238	